

## **REMARKS / ARGUMENTS**

Reconsideration and withdrawal of the rejections set forth in the Office Action dated March 22, 2005, are respectfully requested. Claims 1-7, 15, 17-23, and 29-34 are currently pending this application. Claim 34 is new.

### **The Prior Art (Matsumoto et al.)—Claim 1**

The Examiner rejected claims 1 and 2 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,962,977 (hereinafter, Matsumoto et al.). Matsumoto et al. teach an electrode coating containing lithium, an alkaline metal, which is employed as electron emission material (col. 2, lines 15-20; FIG. 2, ref. 21). Matsumoto et al. do not use the term "getter" at any point in the reference, and do not discuss the elimination of gaseous impurities, which is the function of getter materials. Contrary to the Examiner's assertion at page 3 of the Office action, lithium is not, to the applicants' knowledge, a known getter material. The applicants respectfully request that the Examiner provide support for the assertion that lithium is a known getter material or, in the alternative, recant the assertion.

Moreover, Matsumoto et al. teach "[f]or electrode 14, as is shown schematically in FIG. 2, on the entire surface of electrode substrate 20, with the exception of the connection area to line 13, an electron emission material layer 21 which contains lithium..." (col. 3, lines 28-30). Thus, the inner surface of Matsumoto et al. is completely covered by the lithium compound.

### **The Prior Art (Matsumoto et al.) Distinguished—Claim 1**

Claim 1 includes the language "a layer of getter material." To anticipate a claim, the reference must teach every element of the claim. MPEP 2131. Since Matsumoto et al. do not teach a layer of getter material, the applicants respectfully assert that Matsumoto et al. fail to teach every element of claim 1. Accordingly, claim 1 is patentable over the Matsumoto et al. reference.

In addition, Claim 1 includes the language "wherein an outer and inner surface portion of said cylindrical hollow part includes a layer of getter material." Since Matsumoto et al. teach covering the entire inner surface with the lithium compound, Matsumoto et al. teach away from providing a layer of getter material on the inner surface. Such a layer of getter material would cover the lithium compound in direct contravention to the teachings of Matsumoto et al.

Claims 2-7 and 15, which depend from claim 1, are allowable because they depend from an allowable base claim.

**The Prior Art (Evans et al. and Slack et al.)—Claim 1**

The Examiner rejected claims 1-3 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,856,726 (hereinafter Evans et al.) in view of U.S. Patent 2,295,694 (hereinafter Slack et al.). The Examiner admits at page 3 of the Office action that Evans et al. fails to teach wherein an inner surface portion of the cylindrical hollow part includes a layer of getter material, but that Evans teaches in the analogous art wherein an inner surface portion of the cylindrical hollow part includes a layer of getter material (col. 7, lines 25-30). Contrary to the Examiner's assertion, Evans et al. actually teach away from including an inner surface portion of the cylindrical hollow part includes a layer of getter material with the language "[t]he performance benefit of the threaded electrode is... in the reduced deterioration of the lamp through sputtered getter (emitter) material." (Col. 8, lines 14-21). Indeed, Evans et al. indicated that an electrode with "8488 getter internal coating" does not work for the intended purpose: "The can electrode showed a wide variation in starting cycles extending as high as 8 or more cycles. In some instances, the can and getter type electrode failed to initiate an arc condition within an acceptably safe time, causing the ballast's no fault safety circuit to time out, thereby shutting down the lamp." (Col. 7, lines 26-33). Thus, Evans et al. actually teach that an internal coating of getter ***does not work properly***.

Slack et al. teach a getter may be affixed to an electrode (FIG. 2, ref. 15). Contrary to the Examiner's assertion, Slack et al. do not teach an outer surface portion of a cathode having a getter layer. The electrode is described only as an electrode, not a cathode. The electrode is not hollow, which means a getter layer on an inner portion of the electrode is nonsensical. Moreover, the getter material disclosed by Slack et al. (activated alumina) is not compatible with the internal surface of a hollow cathode because it would adversely affect electron emission properties. The applicants note that the Slack et al. patent was filed on June 19, 1941. At that time, to the knowledge of the applicants, a hollow cathode lamp had not yet been invented.

#### **The Prior Art (Evans et al. and Slack et al.) Distinguished—Claim 1**

There is no suggestion or motivation to combine a getterless threaded cathode, as taught by Evans et al., with a solid electrode having a circumferential ring of getter material attached thereto, as taught by Slack et al. (see, e.g., FIG. 2). Evans et al. explicitly teach away from using getter material on the inside of the cathode. Since Slack et al. teach a solid electrode and getter material that would adversely affect electron emission properties, Slack et al. could not obviously be characterized as providing a suggestion or motivation to apply a getter material on the inside of a hollow cathode.

There is no reasonable expectation of success when combining the Evans et al. and Slack et al. references. Evans et al. teach a hollow getterless cathode, while Slack et al. make use of a solid electrode with getter attached thereto (or nearby). In addition, the getter material used by Slack et al. would adversely impact electron emission properties. The teachings of Evans et al. would not obviously work with a solid electrode and the teachings of Slack et al. would not obviously work with a hollow cathode (which in any case, the applicants believe, had not been invented at the time of filing).

The Evans et al. and Slack et al. references do not teach each element of claim 1. Evans et al. teaches a hollow getterless cathode and Slack et al. teach getter material attached to a solid electrode. Claim 1 includes the language, "said cathode formed by a cylindrical hollow part..., wherein an outer and inner surface portion of said cylindrical hollow part includes a layer of getter material." Even if the Evans et al. and Slack et al. references were somehow combined (which, the applicants believe, is not appropriate), there is no teaching of a getter layer on an outer surface of a cylindrical hollow part of a cathode, much less a teaching of a getter layer on an outer and inner surface.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation to modify the reference or to combine reference teachings; there must be a reasonable expectation of success; and the prior art references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the applicant's disclosure. MPEP 2142.

Since there is no suggestion or motivation to modify the references, no reasonable expectation of success, and all the claim limitations are not taught or suggested by the references, Evans et al. and Slack et al., alone or in combination, do not render Claim 1 obvious. Claims 2-7 and 15, which depend from claim 1, are allowable because they depend from an allowable base claim.

#### **Claims 4-6**

The Examiner rejected claim 4 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Slack et al. and U.S. Patent 6,121,729 (hereinafter, Takao et al.). The Examiner rejected claim 5 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Slack et al. and U.S. Patent 2,295,694 (hereinafter, Hanada et al.). The Examiner rejected claim 6 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Slack et al. and U.S. Patent

4,461,981 (hereinafter, Saikatsu et al.). The Examiner rejected claim 7 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Slack et al. and U.S. Patent 5,242,559 (hereinafter, Giorgi).

As previously discussed, Evans et al. teach a hollow getterless cathode. Slack et al., on the other hand, teach a solid electrode and getter material that would adversely affect electron emission properties.

#### **Claim 4**

Takao et al. teach that a coil with a getter material is wound around a solid electrode. Notably, Takao et al. do not teach a getter layer on the electrode, nor do Takao et al. discuss hollow cathodes. Accordingly, for reasons similar to those described previously with reference to Evans et al. and Slack et al., there is no suggestion or motivation to combine Takao et al. with Evans et al.; there is no reasonable expectation of success; and Takao et al., Evans et al., and Slack et al., whether considered alone or in combination, do not teach "said layer of getter material[,]" which an outer and inner surface portion of said cylindrical hollow part includes, as recited in claim 4.

#### **Claim 5**

As the Examiner admits at page 6 of the Office action, Evans et al. and Slack et al. fail to teach the getter material is an alloy that includes zirconium or titanium combined with one or more elements selected among the group of transition metals and aluminum. The Examiner asserts that Hanada et al. teach a getter material is an alloy that includes zirconium or titanium combined with one or more elements selected among the group of transition metals and aluminum (abstract choose aluminum and nickel and zirconium). Hanada et al. teach applying getter material to an electrode shield (see FIG. 4) or an anode (see FIGS. 2-3). However, Hanada

et al. do not disclose a hollow cathode. Moreover, Hanada et al. do not describe applying getter material to a cathode.

As explained with reference to Claim 1, Evans et al. teaches away from applying a getter layer to a hollow cathode. Slack et al. also fails to provide a teaching to apply a getter layer to a hollow cathode. Hanada et al. also fails to teach applying a getter layer to a cathode, and fails to teach a hollow cathode. Accordingly, for reasons similar to those described previously with reference to Evans et al. and Slack et al., there is no suggestion or motivation to combine Hanada et al. with Evans et al.; there is no reasonable expectation of success; and Hanada et al., Evans et al., and Slack et al., whether considered alone or in combination, do not teach "said layer of getter material[,]" which an outer and inner surface portion of said cylindrical hollow part includes, as recited in claim 5.

#### **Claim 6**

The Examiner admits, at page 7 of the Office action, that Evans et al. and Stack et al. fail to teach getter material formed by cathodic deposition, and relies upon Saikatsu to teach cathodic deposition.

Saikatsu teaches "sputter coating" a getter material from a getter-emitting structure onto an end portion of a glass bulb. The use of the word "sputter" in Saikatsu is different from the use of the term in the art of cathodic deposition. As is used in the art, sputter refers to eroding a target by impact from charged ions. The particles removed from the target (ions, atoms, or "clusters" of atoms) deposit on available surfaces. Saikatsu, on the other hand, teaches using a flash getter to splatter getter material onto a surface. Specifically, Saikatsu states, at col. 6, line 67 to col. 7, line 6:

Where a flash getter is used, it is desirable to heat the getter emitting structure 7, for example by high frequency induction heating to flash the barium metal

which is a major component of the getter. The getter material is thereby sputter coated onto the device over a region which covers an inner wall of the end portion of the glass bulb 2 and the edge of the stem 3, as indicated by reference numeral 10 in FIG. 4.

Saikatsu again makes reference to "sputter coating" at col. 7, lines 30-37:

The getter structure 7 in FIG. 4 comprises a barium-aluminum alloy buried in a groove on an iron base shaped like a doughnut, is clad with nickel, and contains barium at a ratio of 55 percent. The getter structure was heated to a temperature of about 1100° C by high frequency induction heating so that the getter flashed and was thereby sputter coated over a region excluding the electrode 5.

As is apparent from the use of the term "sputter coated" by Saikatsu, Saikatsu does not use sputter to mean cathodic deposition. Rather, the term is intended to mean splatter, or some analogous term. The resultant coating would be likely to have different characteristics depending upon whether cathodic deposition-type sputtering or splatter-type sputtering techniques were used.

Claim 6 includes the language "said getter layer is formed by cathodic deposition." Since Evans et al., Slack et al., and Saikatsu, whether considered alone or in combination, do not teach cathodic deposition, Claim 6 is patentable over the references.

#### **The Prior Art (Evans et al.)—Claim 17**

The Examiner rejected claims 17-19, 29, 30, and 33 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. The Examiner asserts at page 10 of the Office action that the first end of the cathode is free of the layer of getter material because the outer surface near the cylindrical hollow part there is a portion of the surface without getter material. However, none of the embodiments described by Evans et al. include getter material. While Evans et al. describe an experiment that

shows the ineffectiveness of an internal coating of getter, the description does not allude to a portion of a surface is free of the getter material, or provide any motivation to have a portion that is free of the getter material.

**The Prior Art (Evans et al.) Distinguished—Claim 17**

Claim 17 includes the language "a portion of said surface near said first end of said cathode is free of said layer of getter material." There is no teaching of a cathode having a layer of getter material, where a portion near a first end of the cathode surface is free of the layer of getter material. For this reason, and reasons described previously with reference to Claim 1, Claim 17 is allowable over Evans et al.

Claims 18-23 and 29-33, which depend from claim 17, are allowable because they depend from an allowable base claim.

**Claims 20-22, 29-33**

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Takao et al. The Examiner rejected claim 21 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Hanada et al. The Examiner rejected claim 22 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Saikatsu et al. The Examiner rejected claim 23 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. in view of Giorgi. The Examiner rejected claim 31 and 32 under 35 U.S.C. 103(a) as being unpatentable over Evans et al. and Slack et al.



### **Claim 20**

Takao et al. teach that a coil with a getter material is wound around a solid electrode. Notably, Takao et al. do not teach a getter layer on the electrode, nor do Takao et al. discuss hollow cathodes. Accordingly, for reasons similar to those described previously with reference to Claim 4, there is no suggestion or motivation to combine Takao et al. with Evans et al.; there is no reasonable expectation of success; and Takao et al. and Evans et al., whether considered alone or in combination, do not teach "said layer of getter material[,]" which is present on an outer or inner surface portion of said cylindrical hollow part, as recited in claim 20.

### **Claim 21**

As the Examiner admits at page 12 of the Office action, Evans et al. fails to teach the getter material is an alloy that includes zirconium or titanium combined with one or more elements selected among the group of transition metals and aluminum. The Examiner asserts that Hanada et al. teach a getter material is an alloy that includes zirconium or titanium combined with one or more elements selected among the group of transition metals and aluminum (abstract choose aluminum and nickel and zirconium). Hanada et al. teach applying getter material to an electrode shield (see FIG. 4) or an anode (see FIGS. 2-3). However, Hanada et al. do not disclose a hollow cathode. Moreover, Hanada et al. do not describe applying getter material to a cathode.

As explained with reference to Claim 1, Evans et al. teaches away from applying a getter layer to a hollow cathode. Hanada et al. also fails to teach applying a getter layer to a cathode, and fails to teach a hollow cathode. Accordingly, for reasons similar to those described previously with reference to Evans et al., there is no suggestion or motivation to combine Hanada et al. with Evans et al.; there is no reasonable expectation of success; and Hanada et al. and Evans et al., whether considered alone or in combination, do not teach "said layer

of getter material[,]" which is present on an outer or inner surface portion of said cylindrical hollow part, as recited in claim 21.

### **Claim 22**

Saikatsu teaches "sputter coating" a getter material from a getter-emitting structure onto an end portion of a glass bulb. As described previously with reference to Claim 6, the use of the word "sputter" in Saikatsu is different from the use of the term in the art of cathodic deposition. As is used in the art, sputter refers to eroding a target by impact from charged ions. The particles removed from the target (ions, atoms, or "clusters" of atoms) deposit on available surfaces. Saikatsu does not use sputter to mean cathodic deposition. Claim 22, on the other hand, includes the language, "said layer of getter material is formed by cathodic deposition."

### **Claim 29**

The Examiner asserts at page 11 of the Office action that Evans et al. discloses wherein a portion of the surface near the second end is at least partially covered by the layer of getter material. However the supporting citation refers only to the text: "In a similar fashion, the Applicant's best alternative electrode was tested. This electrode was constructed as a straight can type electrode with 8488 getter internal coating. The can electrode showed a wide variation in starting cycles extending as high as 8 or more cycles." The Examiner admits that "Evans does not write partially coated internal surface," but nevertheless asserts that the portion of the surface near the second end is at least partially covered. Notably, however, Claim 17, from which Claim 29 depends, includes the language, "a portion of said surface near said first end of said cathode is free of said layer of getter material." This means that, in Claim 29, a portion of the surface is free of getter material and a portion of the surface is at least partially coated.

Evans et al., as the Examiner noted, provides no description of a partial coating of a surface. Moreover, the Examiner has provided no suggestion or motivation to partially coat a surface. Indeed, if the only motivation to do so is "to improve lamp gettering," as the Examiner has suggested at page 10 of the Office action with reference to Claim 17, then the motivation would be to cover the entire surface, since that would provide even more gettering. Evans et al., on the other hand, only provide a motivation to use no gettering, favoring a threaded electrode over a can electrode with getter on it. Accordingly, there is no suggestion or motivation to partially coat the surface.

Claim 29 includes the language, "a portion of said surface near said second end is at least partially covered by said layer of getter material." Since there is no suggestion or motivation to partially coat the surface, Claim 29 is allowable over Evans et al.

### **Claim 30**

Claim 30 includes the language, "said getter layer is present on the inner portion of the said surface." Since there is no suggestion or motivation to partially coat the inner surface, Claim 30 is allowable over Evans et al.

### **Claim 31**

Claim 31 includes the language, "said getter layer is present on the outer portion of the said surface." Since there is no suggestion or motivation to partially coat the outer surface, Claim 31 is allowable over Evans et al and Slack et al. Moreover, Claim 31 is allowable over Evans et al. and Slack et al. for reasons similar to those described with reference to Claim 1 (e.g., no motivation to combine, no reasonable expectation of success, failure to teach a getter layer on an outer portion of a hollow cathode).

**Claim 32**

Claim 32 includes the language, "said getter layer is present on the inner and outer portion of the said surface." Since there is no suggestion or motivation to partially coat the inner or outer surface, Claim 32 is allowable over Evans et al and Slack et al. Moreover, Claim 32 is allowable over Evans et al. and Slack et al. for reasons similar to those described with reference to Claim 1 (e.g., no motivation to combine, no reasonable expectation of success, failure to teach a getter layer on an outer portion of a hollow cathode).

**Claim 33**

The Examiner asserted at page 11 of the Office action that "the outer surface of Evans cylindrical cup (ref. 28) of electrode does not have a getter layer on it, so therefore the portion of the outer surface near the second end is free of the layer of getter material." The applicants respectfully point out that the cylindrical cup (ref. 28) does not have **any** getter.

Claim 33 includes the language, "a portion of said surface near the second end of said cathode is free of said layer of getter material." The layer of getter material of Claim 33 has an antecedent basis that requires its existence on the cathode. The cylindrical cup (ref. 28) of Evans et al. does not have a layer of getter material. Since Evans et al. does not teach every element of Claim 33, Claim 33 is allowable over Evans et al.

**Conclusion**

In view of the foregoing, Applicant submits that the claims pending in the application patentably define over the prior art. A Notice of Allowance is therefore respectfully requested.

If in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is encouraged to call the undersigned at (650) 838-4300.

Respectfully Submitted,  
PERKINS COIE LLP

A handwritten signature in black ink, appearing to read 'William F. Ahmann', with a long horizontal flourish extending to the right.

William F. Ahmann  
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Date: June 22, 2005

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